



Site Assessment Essentials

*EPA Region III
Justin Bleiler
Connor O'Loughlin
Lorie Baker
Cathleen Kennedy*

Course Outline

- ◆ Introduction to CERCLA
- ◆ Site Assessment
- ◆ PFAS Case Study
- ◆ VI Case Study
- ◆ Removal
- ◆ Remedial
- ◆ Enforcement
- ◆ Community Involvement
- ◆ Brownfields

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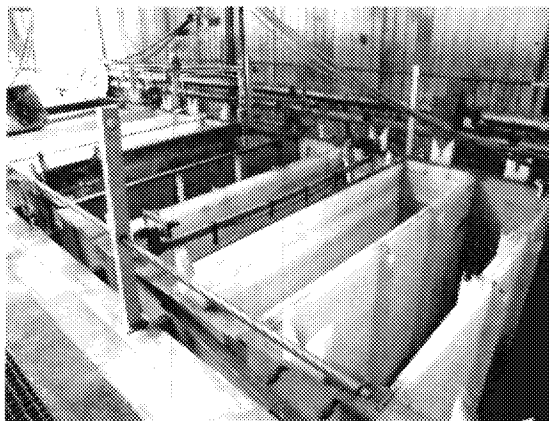
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Connor O'Loughlin
Site Assessment Manager
EPA, Region 3
(215) 814-3304
oloughlin.connor@epa.gov

CASE STUDY ABOUT PFAS BLADES GROUNDWATER

Introduction to Site Assessment

- ◆ EPA conducted a site review in cooperation with and on behalf of the State's VCP program to investigate the PFAS contamination in Blades, DE.
- ◆ EPA's removal and site assessment programs responded to the contamination.



Identification of the Blades Site

- ◆ EPA conducted a site review as part of the State lead remedial investigations.
- ◆ *Fumetrol* 140 and chromium tetrafluoroborate use at two electroplating facilities.



Fumetrol 140 - Specific Gravity:1.025
ORGANIC FLUOROSULFONATE 7% by volume

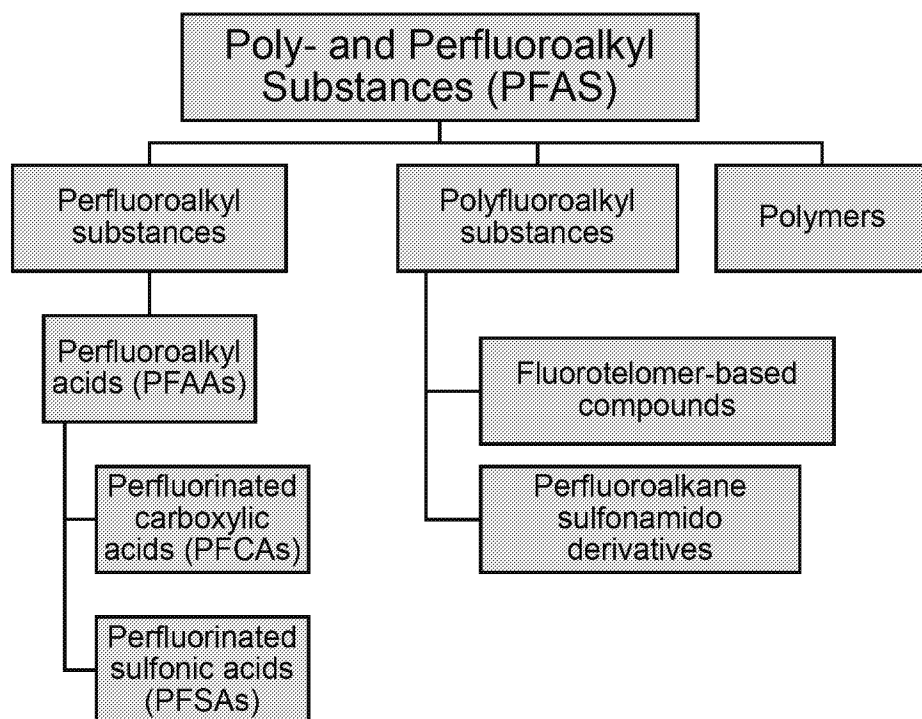


Investigation of the Blades Site

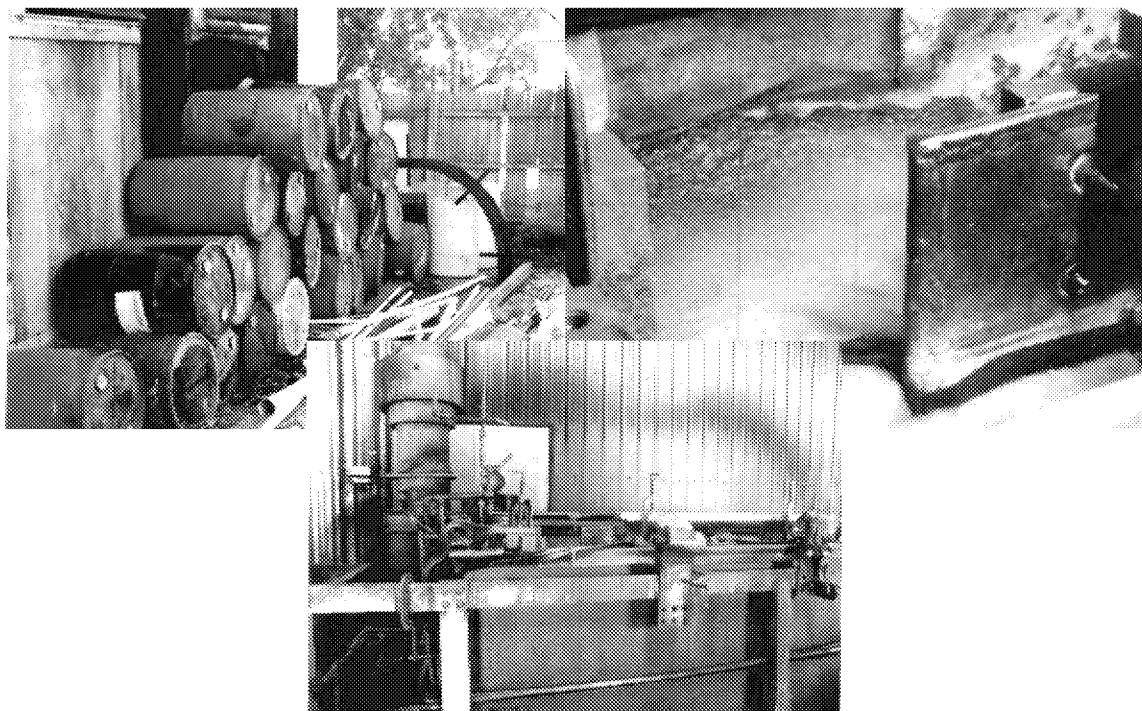
- ◆ Further assessment is continuing to determine the source(s) of this contamination.
- ◆ The contamination from both facilities may be comingled containing PFAS, chromium, and cyanide.
- ◆ Both facilities have used multiple types of plating processes.



The data and facts that were easily ascertained during the SI using environmental samples and standard hydrological methods: Further, PFAS distribution; field scale lithology; subsurface hydrogeologic conditions - including groundwater flow direction, velocity, and influence of heterogeneous geology. Onsite, EPA identified from the previous boring logs three alternating sand/clay layers - thus becoming the zones to target from groundwater wells.



Site Assessment Photographs



Investigation of the Blades Site

◆ Sample Results

- 3 wells had results exceeding the combined PFOA/PFOS - HAL.
 - Drinking Water - 193.0, 117.5, and 96.2 (ppt)
- Nine residential wells had concentrations above the HAL. Delaware installed treatment for the wells.
- One residential well had a concentration of 364 ppt.

◆ EPA still conducting assessment of the groundwater plume.

- Known contamination of the groundwater and soil.
- Threats to the surface water (human food chain, wetlands).
- Inadequate controls and no remediation of groundwater to date.
- Abundant potential source soils at the two facilities.

Investigation Considerations and PFAS Facts

◆ Regulation:

- U.S. Environmental Protection Agency (U.S. EPA) drinking water lifetime health advisory for the sum of PFOA and PFOS of 70 ng/L.
- The State of Delaware has designated PFOA and PFOS a hazardous substances as of July, 2018 and requires an investigation within 1,000 feet of affected facilities.

◆ Mapping/Geospatial:

- Extent of potential affects. Maximum concentrations and magnitude of affect.
- Lithological layers - higher permeability units, confining units.
- Affected wells, affected rivers and wetlands i.e. (Targets and Receptors)

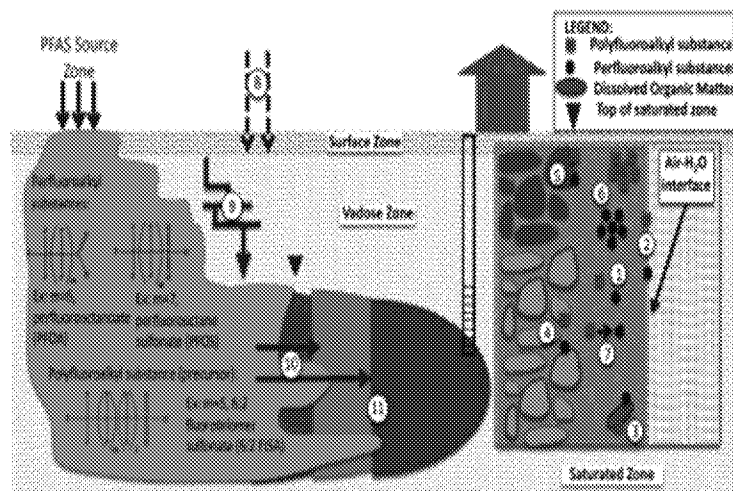
◆ Fate:

- PFASs is highly water soluble with weak soil sorption and exhibit recalcitrance to natural degradation, leading to the potential for large but narrow groundwater plumes.

◆ Transport:

- Transport in sandy lithological layers and higher permeability units and confining units.
- PFAS compounds flow readily with a density close to water.
- High solubility.

Conceptual Model at the Blades Site



Site Inspection:

- Well Drilling – 18 new well clusters (shallow, intermediate, deep)
- Collected 9 comingled surface water and sediment samples from the Morgan Branch stream and Nanticoke wetland area adjacent to the town.
- Collected groundwater samples from all 18 existing well pairs on the Procino facility.
- Review residential data from the 50 wells. (2 inch wells are installed 40-105 feet)

Conceptual Model at the Blades Site

Ex. 6 Personal Privacy (PP)/ Ex 9 Wells

Ex. 9 Wells



Sampling Strategy at the Blades Site

- Resample the Town of Blades wells for the SI.
- 18 new SI wells
 - Shallow wells are to identify or to eliminate source areas.
 - Intermediate wells are to determine if the two facilities are comingled and to determine hydrological flow direction.
 - Deep wells are to determine if the facilities are comingled and the regional flow/pumping direction and cone of influence of the public wells.
 - Sample 18 existing wells on the Procino Plating facility to determine the extent of a release.
- Collect 9 comingled surface water and sediment samples.
- Review the method of transporting electroplating fluids through onsite water handling systems and onto the sewer system.
- Review site documents



EPA has identified three alternating lithological layers of sand and dense clay zones of varying thickness.

Drinking water aquifers 66-96 feet in this case was evaluated based on transmissivity and saturated aquifer thickness in order to determine new OB well density and screen depths.

Keep in mind the travel time may be on the order of years to decades with minimal degradation. Dilution factor i.e. distance from the sources would be the only issue to keep in mind.

Blades SI - Photographs



For PFAS investigations I wanted to ensure there would be no cross contamination and therefore I wanted a drilling method where EPA used all steel or metal products or certified free PFAS plastics and well completion materials.

EPA reviewed existing lithology and pre-identified screen elevations intervals and clay thicknesses.

Blades SI - Photographs



Photo on the left, standard auger and split spoon drilling method. I wanted to use methods which would limit the potential for cross contamination of the groundwater samples. The drillers used only steel items and standard metal tooling.

Photo on the right slit spoon to 45-47 feet sand on top with dark gray clay layer. Set the well into the sand. I attempted to obtain the best lithological controls knowing that PFAS would not sink or sorb like other organic compounds but will flow on top of the clay layers.

Completed groundwater monitoring wells for the SI investigation, down gradient wells over 3000 feet from the sources.

My overall strategy took into account larger distances than typical contaminants, potential flow velocity equaling water and multiple directions. Contamination was found in the stream and sediments 3500 feet down gradient from the site. Due to the longevity of PFAS substances in the environment I had to consider long periods of time to ensure EPA's protects human health and environment.

Blades Groundwater Success Story

- ◆ Cooperative Agreement between EPA and DNREC allowed for open communication identifying contamination in the public wells.
- ◆ EPA, DNREC and the Town of Blades were able to provide safe drinking water in several days to the public once the sample results were available.
- ◆ DNREC and the town installed a public treatment system in several weeks after discovery of PFAS in the public and residential water system.
- ◆ EPA's removal group samples residential wells and provided the public with treatment systems.
- ◆ EPA is currently conducting the SI in consultation with DNREC.

Any Questions?



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